DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Designing a Low-Profile Barrier for Planted Medians

Low-profile barriers protect motorists from hitting trees and shrubs while improving the aesthetics of low-speed highways

Design/ Construction

DECEMBER 2013

Project Title:
Development and Testing of a Low-Profile Barrier

Task Number: 0645

Start Date: February 2, 2004

Completion Date: July 15, 2013

Product Category: New equipment, plan, and specification

Task Manager:
Vue Her
Transportation Engineer
vue.her@dot.ca.gov

WHAT WAS THE NEED?

Several Caltrans districts have requested to plant trees in the medians of low-speed highways to improve aesthetics. However, plantings with an expected mature size greater than 4 inches must be either shielded with a barrier or removed. To not use barriers, trees must be a minimum of 30 feet from the roadway, which is usually not possible in urban environments. Full-size barriers defeat the purpose of the landscaping by reducing the visibility of the trees or shrubs.

Installing a nicely designed, low-profile barrier to protect plantings would allow for better visibility and maintain the aesthetics. Nonproprietary, low-profile barriers suitable for shielding trees in the medians of low-speed highways are not commercially available. Research also showed that little work had been done to develop a barrier that addressed the issues of aesthetics and maintenance and met the test criteria of the National Cooperative Highway Research Program (NCHRP) Report 350 guidelines.

WHAT WAS OUR GOAL?

The goal was to develop a permanent, low-maintenance, crashworthy, low-profile barrier that provides good see-through characteristics for motorists and can be used with or without soil backing on the non-traffic side.

The barrier is 18 inches high and mounted on a concrete footing installed in a soil bed, with posts spaced 10 feet apart.

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WHAT DID WE DO?

Caltrans developed a nonproprietary, permanent, low-profile, narrow barrier that can be used with or without soil backing on the non-traffic side. The final design also accommodated the request for openings in the barrier to provide a more see-through appearance. The barrier is 18 inches high and mounted on a concrete footing installed in a soil bed. The completed barrier was 100 feet long, with posts spaced 10 feet apart.

The barrier was tested as a Test Level 2 (TL-2) longitudinal barrier under the National Cooperative Highway Research Program (NCHRP) Report 350 guidelines. The researchers performed two full-scale tests using the following vehicles to determine whether the barrier meets the NCHRP criteria of safely redirecting vehicles in a collision:

- 2,000-kg pickup truck impacting the barrier at 43.5 mph (70 km/h) at 25 degrees
- 820-kg small car impacting the barrier at 43.5 mph (70 km/h) at 20 degrees

The testing also evaluated the level of maintenance required after a major impact.

Excavation for barrier installation

WHAT WAS THE OUTCOME?

The tests were successful in meeting the criteria and submitted to the Federal Highway Administration for approval. The damage to the barrier was cosmetic and did not require immediate repair, if any.

The researchers recommended that the reinforcing steel configuration of the barrier footing be redesigned to reduce the amount of rebar to reduce cost and installation time. It is also recommended that pavement overlays not be allowed unless enough surface grinding is done to offset the overlay thickness.

WHAT IS THE BENEFIT?

The low-profile barrier allows municipalities to landscape environments with trees along low-speed state highways where they are currently prohibited or require a full-height barrier, improving roadway aesthetics. The barrier protects motorists if they run off the road. The Caltrans barriers reduce project permit delays for local agencies because the design has already been approved. In addition, other median barriers can be installed on the barrier footing, giving municipalities different options, such as a solid-face barrier.

LEARN MORE

To view the complete report:
www.dot.ca.gov/newtech/researchreports/reports/2012/california_low_profile_barrier_final_report.pdf

Crash-testing the barrier